CDF/D0/AD Luminosity Task Force meeting
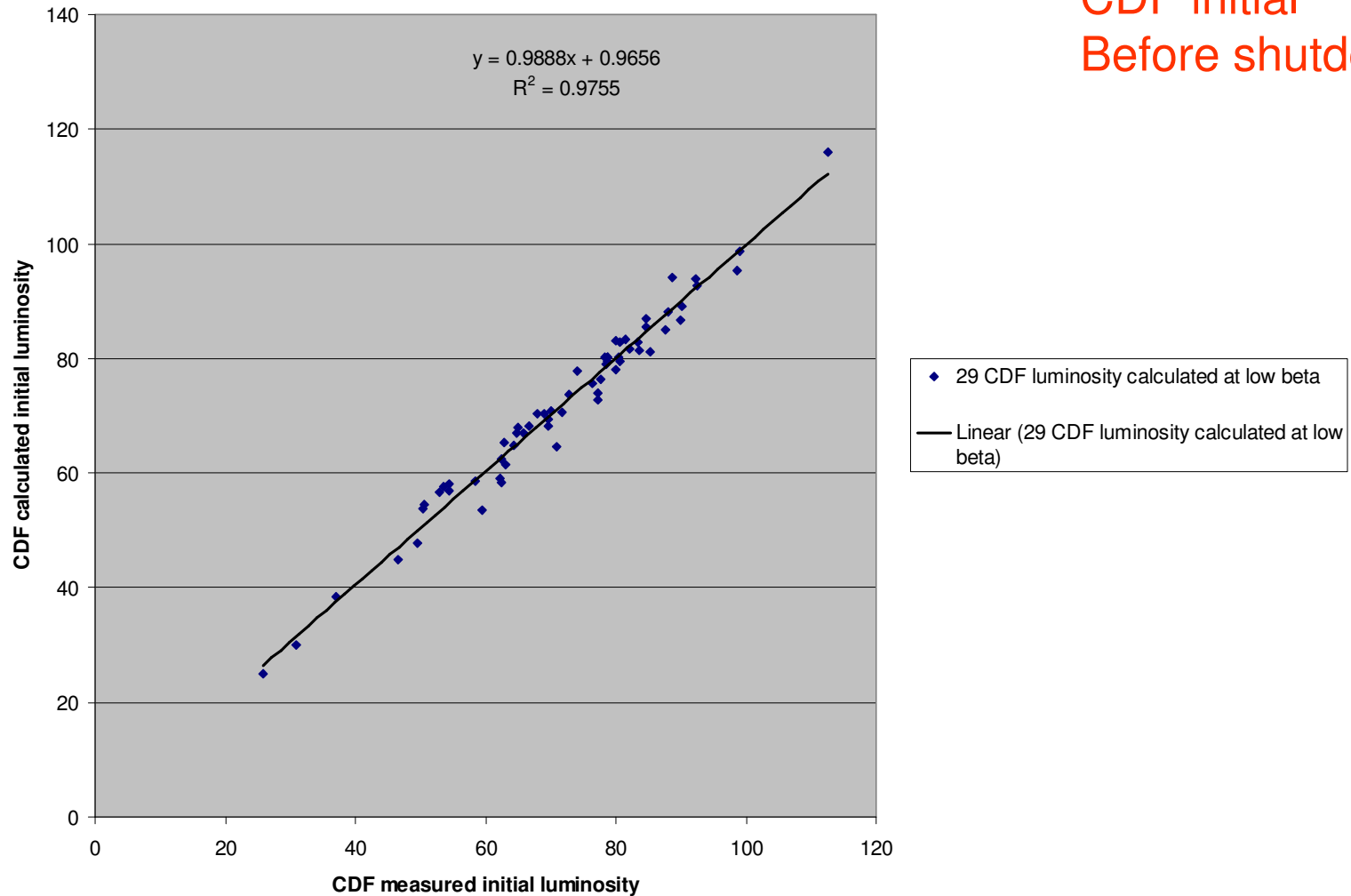
Comparing measured with calculated luminosities before and after the Fall 2004 shutdown

February 23
Vaia Papadimitriou

o The calculated luminosity assumes beta* 35 cm in all following plots for both CDF and D0.

o The beam is assumed to be circular.

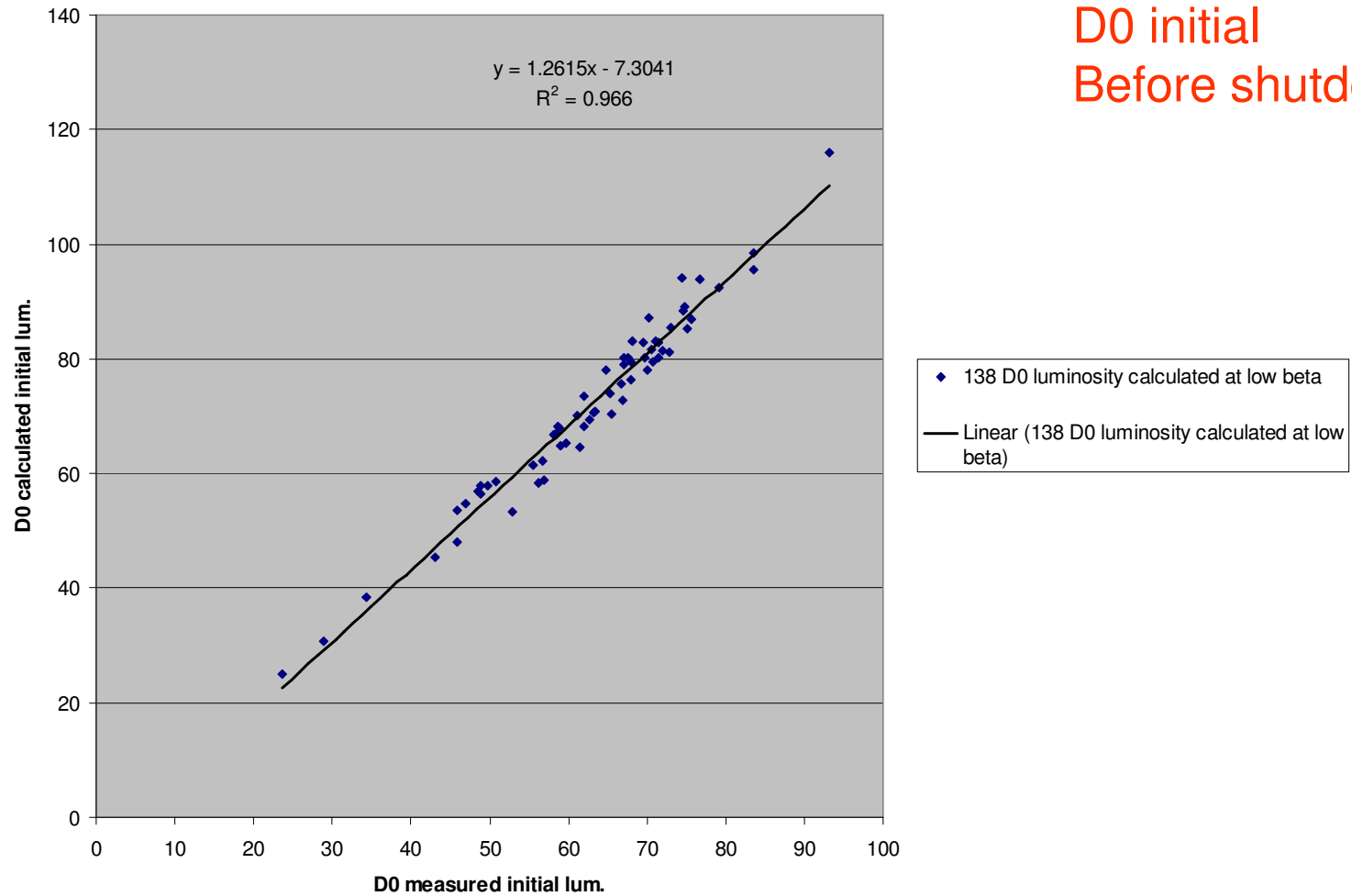o The calculated luminosities have an uncertainty of the order of 15%.

Using stores 3487-3745

CDF luminosity calculated at low beta before shutdown

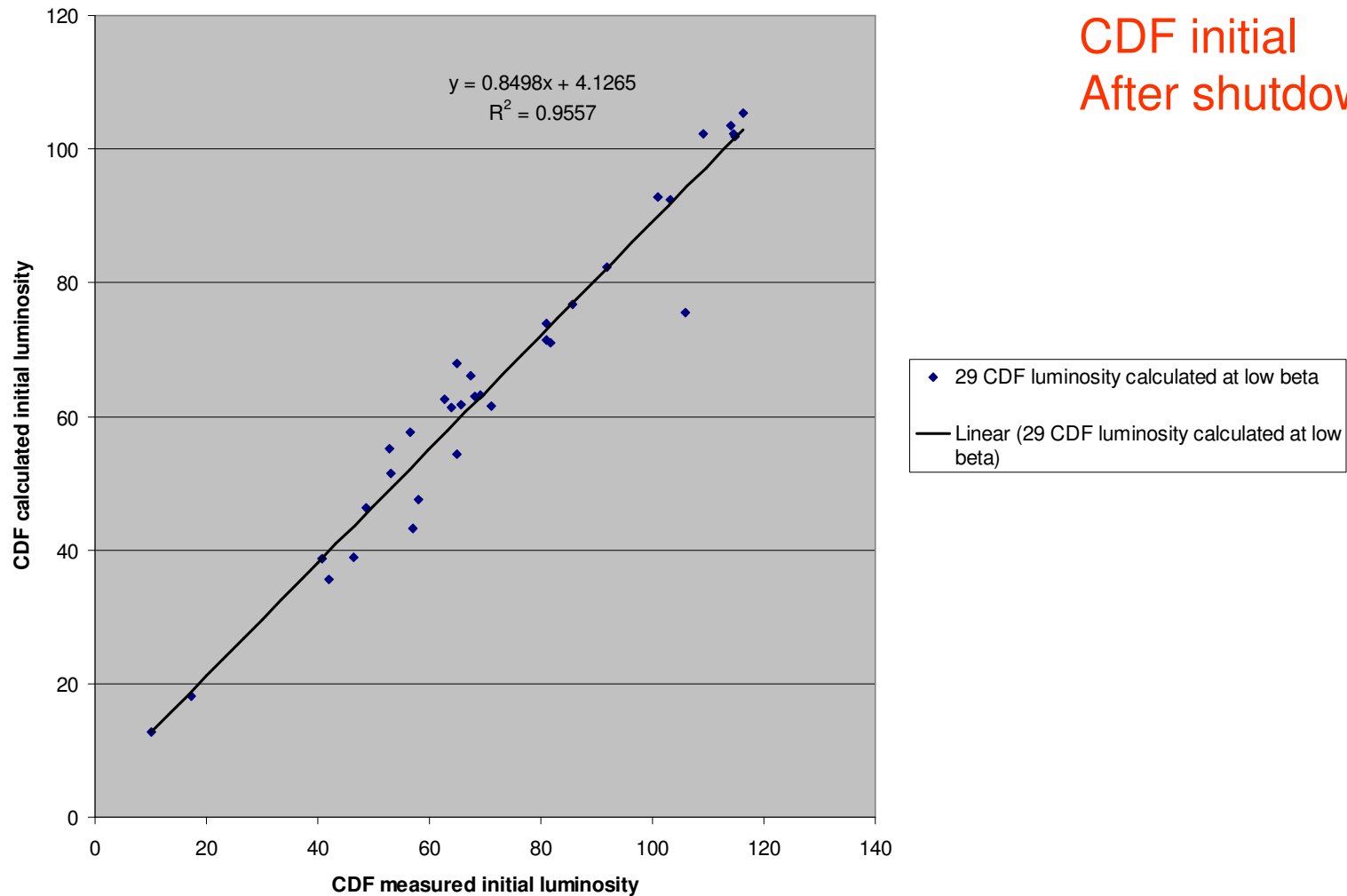$$y = 0.9888x + 0.9656$$
$$R^2 = 0.9755$$

CDF calculated initial luminosity (y-axis)

CDF measured initial luminosity (x-axis)

- ◆ 29 CDF luminosity calculated at low beta
- — Linear (29 CDF luminosity calculated at low beta)

CDF initial
Before shutdown

Using stores 3487-3745

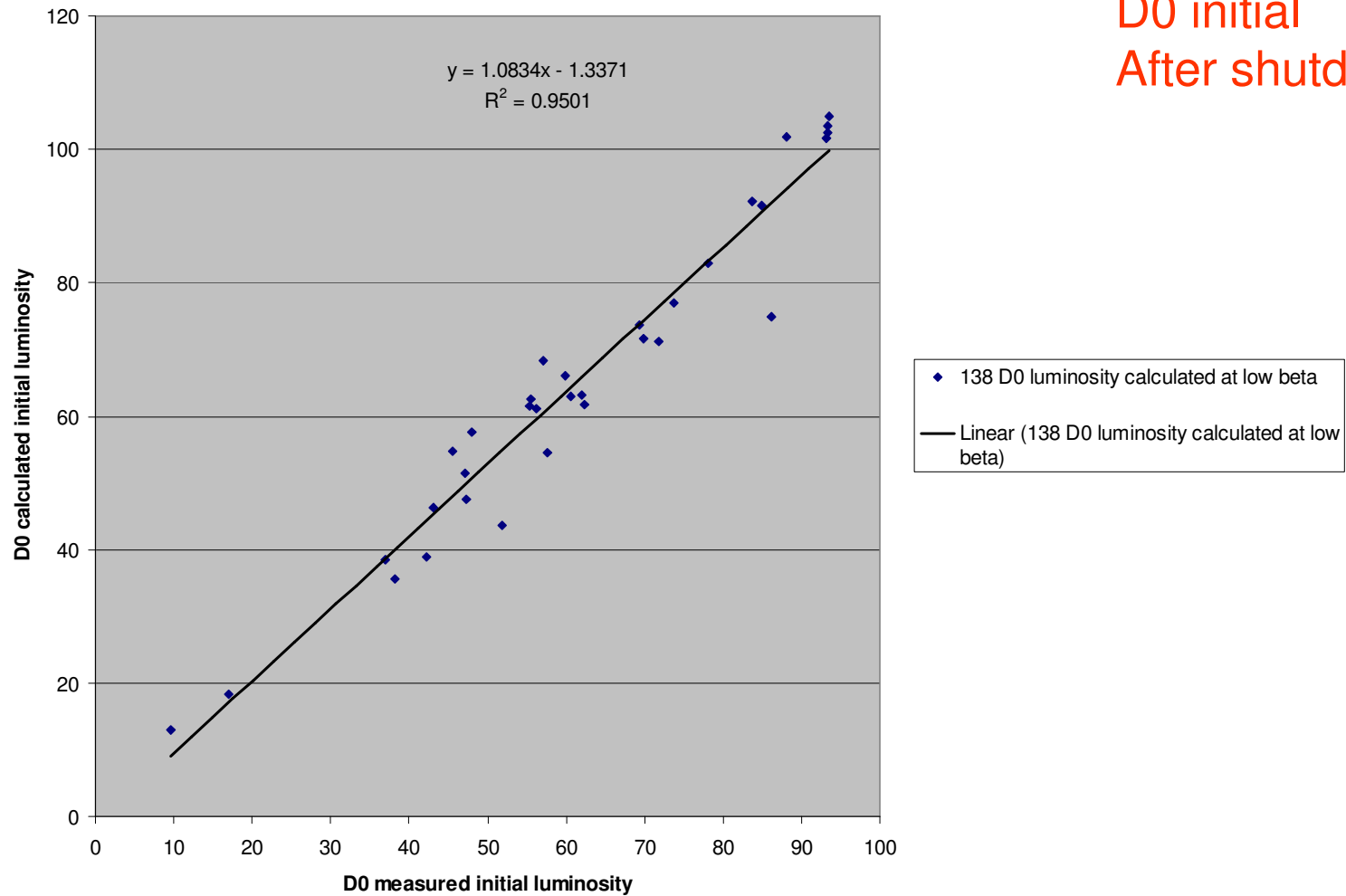**D0 luminosity calculated at low beta before the shutdown**

$y = 1.2615x - 7.3041$

$R^2 = 0.966$

D0 initial
Before shutdown

- ◆ 138 D0 luminosity calculated at low beta
- — Linear (138 D0 luminosity calculated at low beta)

Using stores 3821-3962

CDF luminosity calculated at low beta after the shutdown

$y = 0.8498x + 4.1265$
$R^2 = 0.9557$

CDF calculated initial luminosity

CDF measured initial luminosity

CDF initial
After shutdown

- ◆ 29 CDF luminosity calculated at low beta
- — Linear (29 CDF luminosity calculated at low beta)

Using stores 3821-3962

D0 luminosity calculated at low beta after the shutdown

$y = 1.0834x - 1.3371$
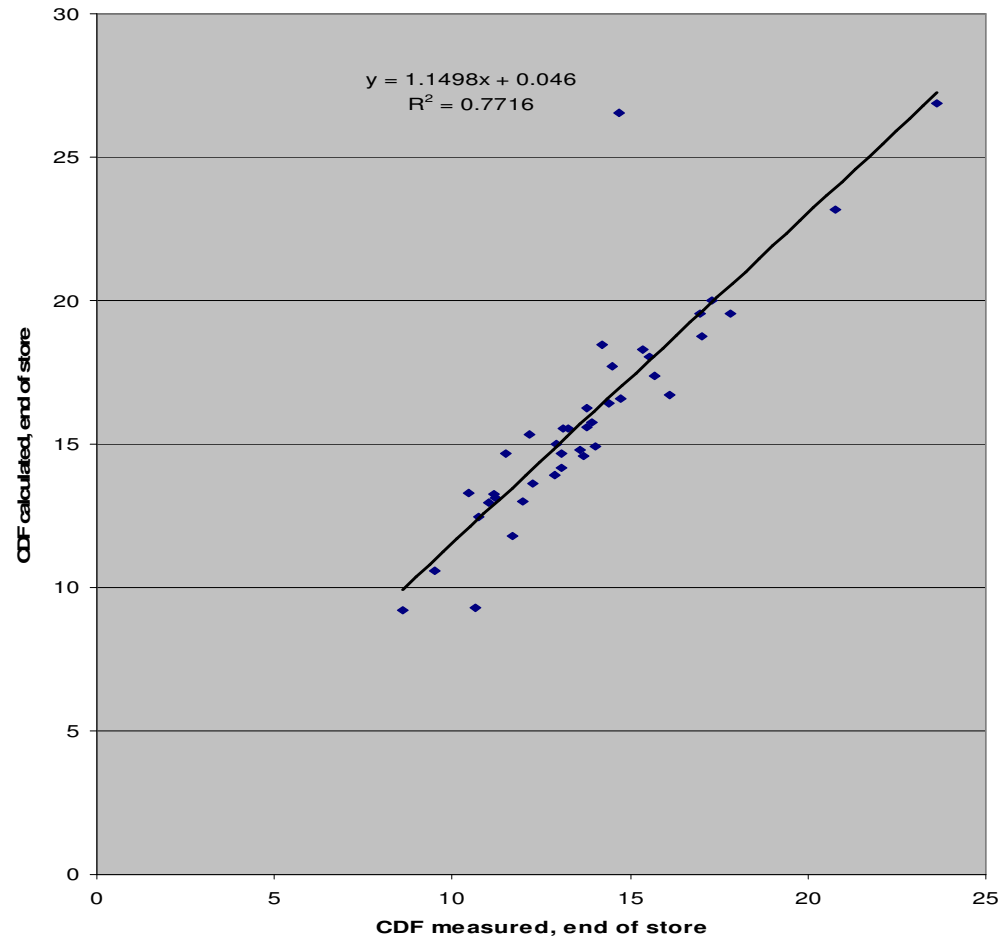
$R^2 = 0.9501$

- ◆ 138 D0 luminosity calculated at low beta
- —— Linear (138 D0 luminosity calculated at low beta)

D0 calculated initial luminosity

D0 measured initial luminosity

D0 initial
After shutdown

Using stores 3487-3745

calculated CDF lum at the end of HEP before shutdown

$y = 1.1498x + 0.046$
$R^2 = 0.7716$

CDF calculated, end of store

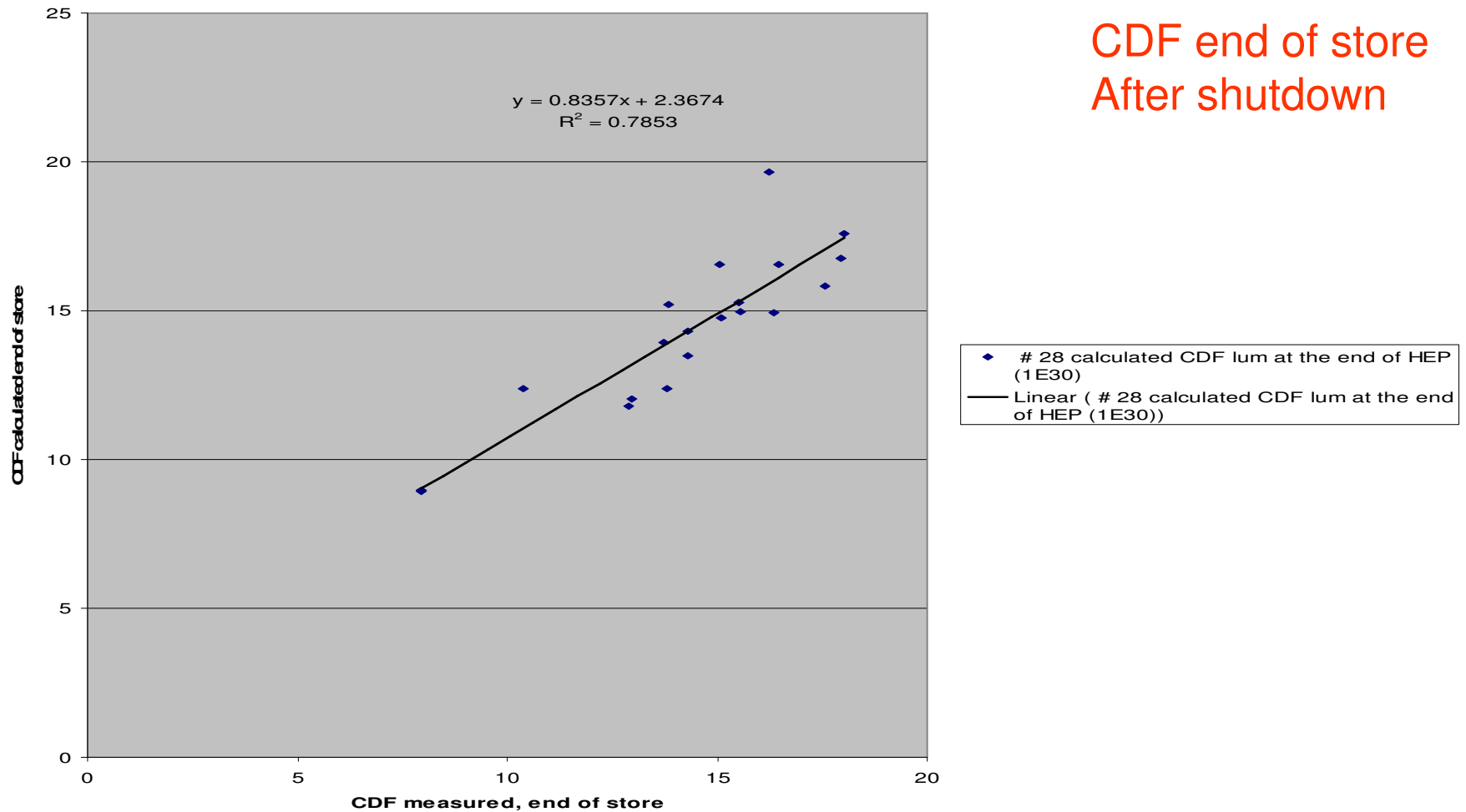CDF measured, end of store

◆ # 28 calculated CDF lum at the end of HEP (1E30)

—— Linear (# 28 calculated CDF lum at the end of HEP (1E30))

CDF end of store
Before shutdown

Using stores 3821-3991

CDF measured vs expected, end of store

$y = 0.8357x + 2.3674$
$R^2 = 0.7853$

CDF end of store
After shutdown

Legend: # 28 calculated CDF lum at the end of HEP (1E30)
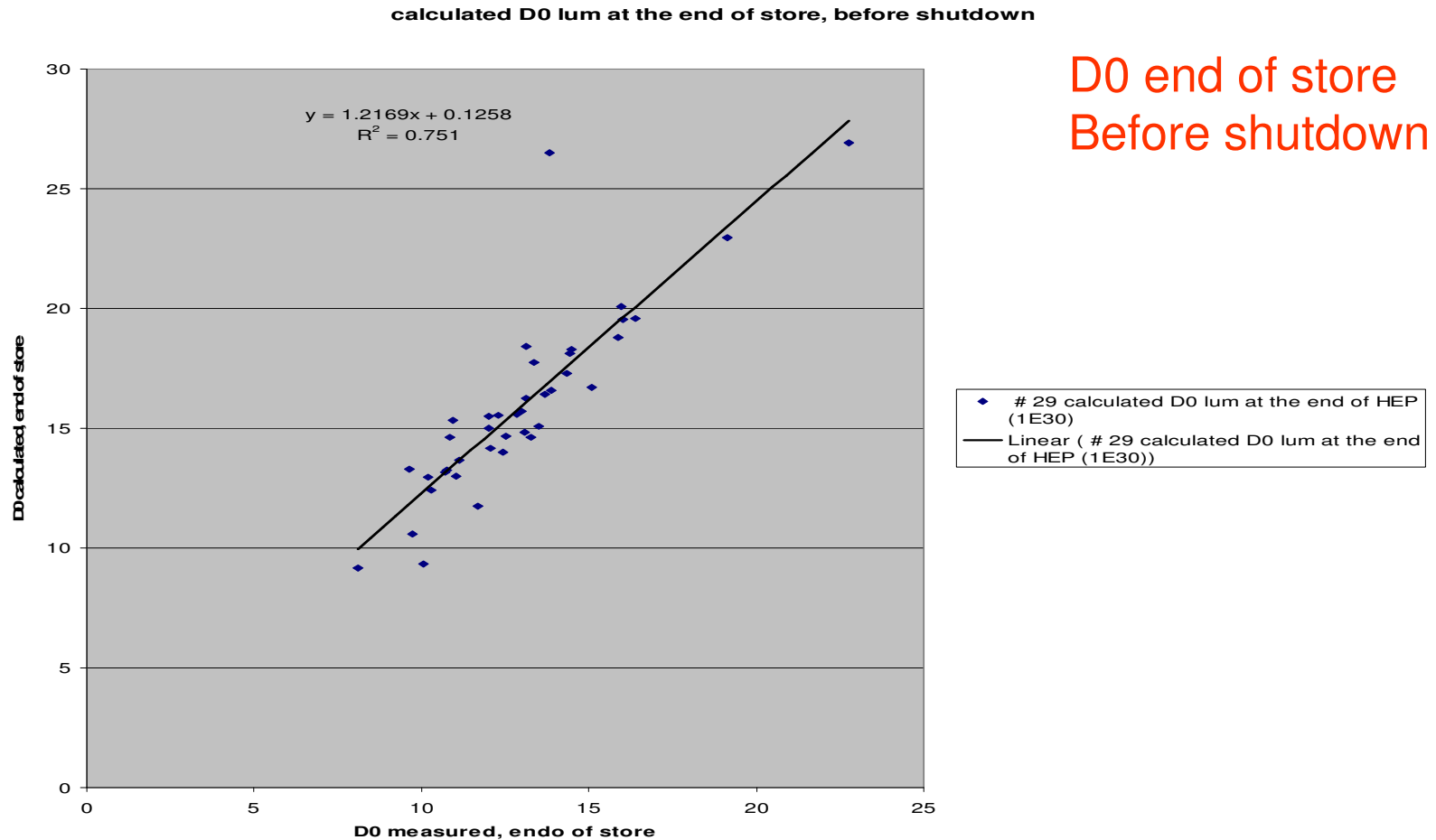Linear (# 28 calculated CDF lum at the end of HEP (1E30))
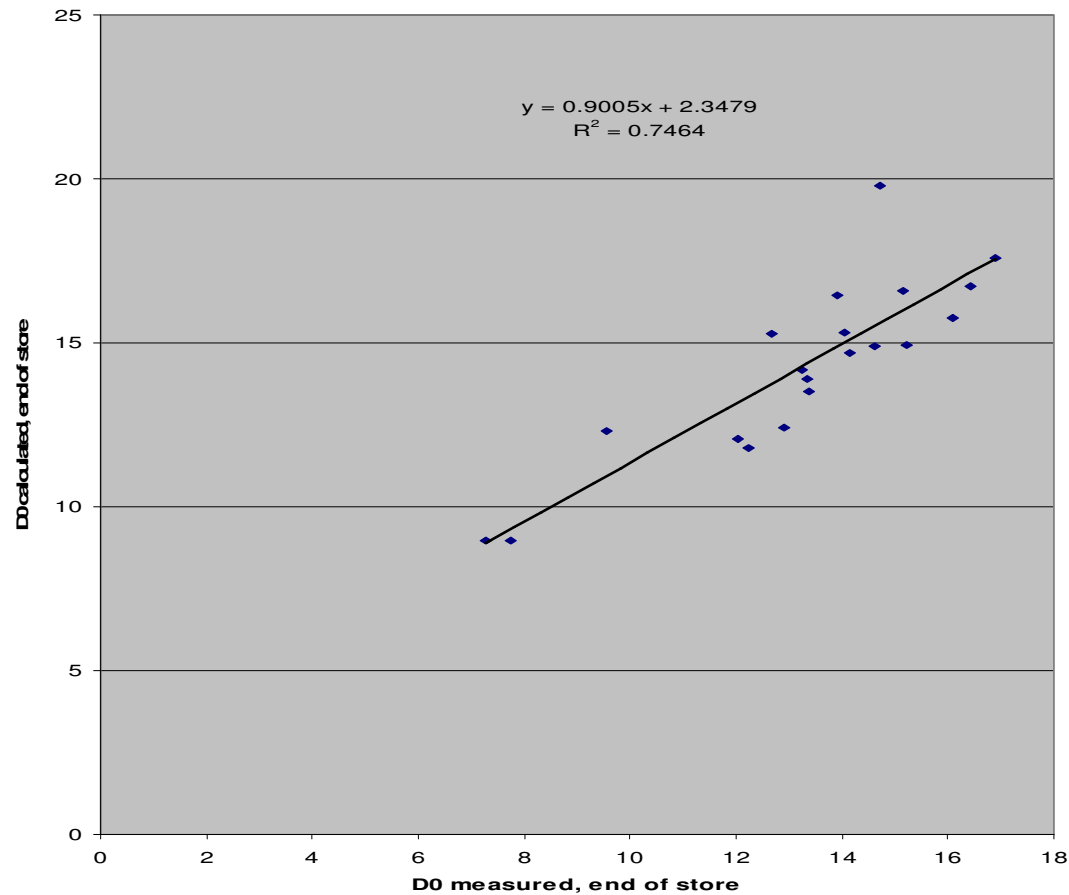
X axis: CDF measured, end of store
Y axis: CDF calculated end of store

Using stores 3487-3745

calculated D0 lum at the end of store, before shutdown

$y = 1.2169x + 0.1258$
$R^2 = 0.751$

D0 calculated end of store

D0 measured, endo of store

- ◆ # 29 calculated D0 lum at the end of HEP (1E30)
- — Linear (# 29 calculated D0 lum at the end of HEP (1E30))

D0 end of store
Before shutdown

Using stores 3821-3991

D0 measured vs calculated end of store luminosity after the October 2004 shutdown

$y = 0.9005x + 2.3479$
$R^2 = 0.7464$
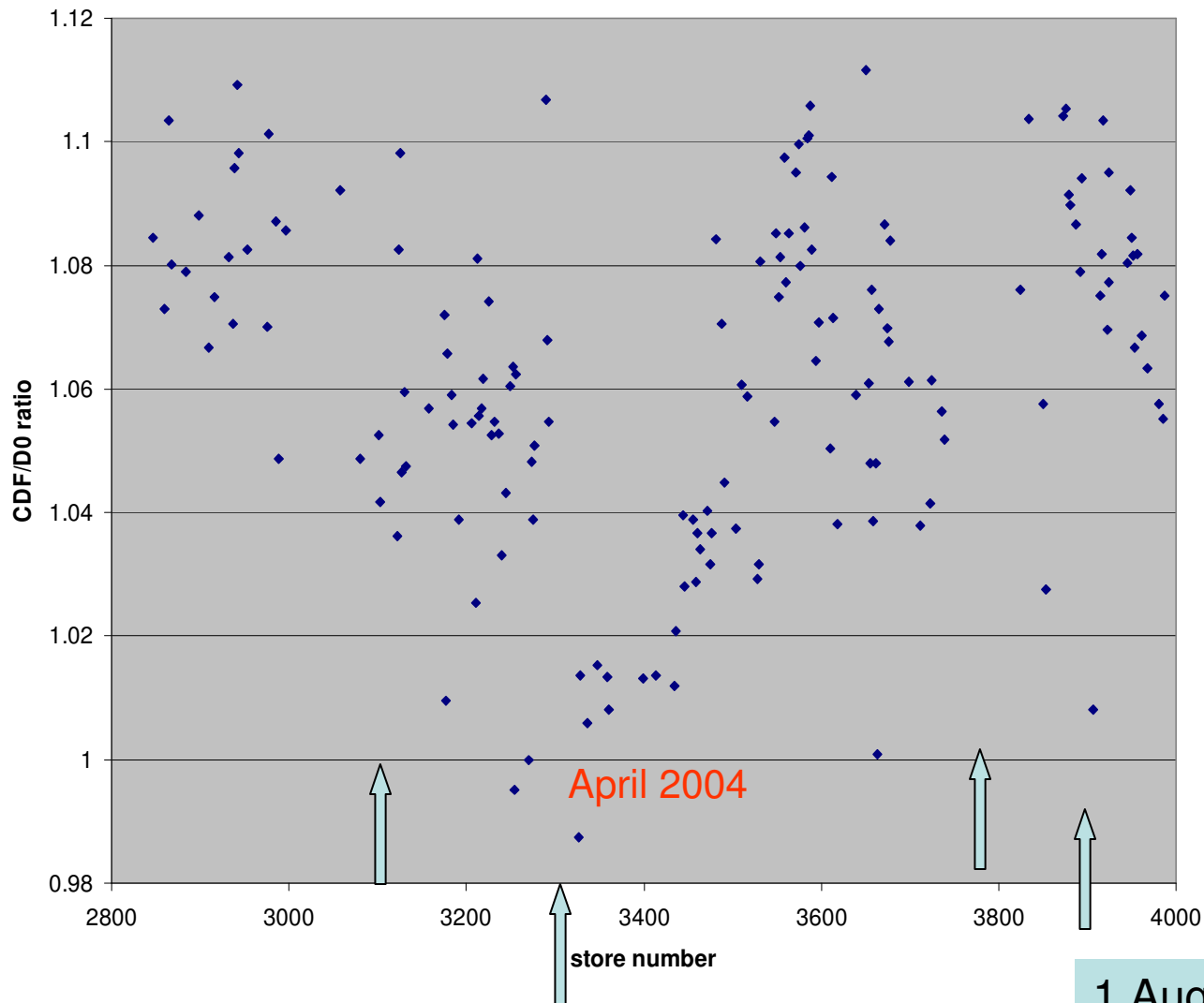
D calculated, end of store

D0 measured, end of store

D0 end of store
After shutdown

◆ # 29 calculated D0 lum at the end of HEP (1E30)

— Linear (# 29 calculated D0 lum at the end of HEP (1E30))

Using stores 2847-3991

CDF/D0 end of store adjusted

CDF/D0 end of
Store history.
Arrows indicate
Low beta quad moves

♦ CDF/D0 end of store adjusted

April 2004

1 Aug. 2003 – 19 Feb. 2005

Conclusion

o The above is suggestive of either beta*s having being reduced at the IPs after the Fall shutdown or that the emittancies have been reduced or both. The emmitancies (measured sigmas as well as lattice functions which are used as input) will be studied before and after the shutdown).

o There is no clear correlation in the ratio of end of store luminosities with low beta Quad moves.